

SUPPORT FOR THE AMENDMENT

Claim 1 is herein amended to use wording consistent with U.S. patent law practice. The word “obtainable” is replaced with “obtained.” The description of Claim 10 is added to Claim 1.

Claim 10 is canceled.

No new matter will be added to the above-identified application by entry of this amendment.

Upon entry of this amendment, Claims 1-9 and 11-13 will be active. Claims 5-8 and 11-13 are withdrawn.

REQUEST FOR RECONSIDERATION

The claimed invention is drawn to an aqueous polymer dispersion based on copolymers of vinylaromatics and butadiene, their preparation and their use as sizes for paper.

Paper, board and cardboard is prepared using sizing agents for the purpose of providing a surface on which inks can be applied to obtain a printing image of good quality. Improvement in printing surface quality of paper, board and cardboard is sought.

The claimed invention addresses this problem by providing an aqueous polymer dispersion based on **copolymers of vinylaromatics and butadiene**, which is obtained by free radical copolymerization of (a) from 0.1 to 99.9% by weight of styrene and/or methylstyrene, (b) 0.1-99.9% by weight of 1,3-butadiene and/or isoprene and (c) from 0 to 40% by weight of other ethylenically unsaturated copolymerizable monomers, the sum of the monomers (a), (b) and (c) always being 100%, in the presence of from 10 to 40% by weight, based on the monomers used, of at least one degraded starch having a molecular weight Mn of from 500 to 40,000 and of water-soluble redox catalysts, the redox catalyst used being a

combination of hydrogen peroxide and at least one heavy metal salt from the series consisting of the cerium, manganese and iron(II) salts wherein the mean particle size of the dispersed polymer particles is from 50 to 100 nm. Such a composition is neither disclosed nor suggested in the cited reference.

Applicants respectfully note that Claim 1 is herein amended to include the description “wherein the mean particle size of the dispersed polymer particles is from 50 to 100 nm.”

Applicants wish to thank Examiner Mulcahy for the useful and courteous discussion of the above-identified application with Applicants’ U.S. representative on January 28, 2008. At that time, description of particle size in the claimed invention and the cited reference was discussed. In addition significant improvement in paper size performance properties according to the claimed invention was pointed out. The following is intended to reiterate and expand upon that discussion.

The rejection of Claims 1-4, 9 and 10 under 35 U.S.C. 103 (a) over Giesecker et al. (U.S. 6,489,382) is respectfully traversed.

The cited reference does not disclose or suggest an **aqueous polymer dispersion based on copolymers of vinylaromatics and butadiene** according to Claim 1, wherein the mean particle size of the dispersed polymer particles is from 50 to 100 nm.

Giesecke is directed to a composition comprising **at least one particulate solid** and a water-dispersible graft copolymer built up from at least one hydrophobic, ethylenically unsaturated monomer, optionally one or more ethylenically unsaturated hydrophilic monomers, and at least one natural protective colloid or protective colloid obtained from a natural protective colloid by derivatization or thermal, enzymatic, oxidative, hydrolytic or bacteriological degradation having an average molar mass of $M_n > 500$ g/mol. (Claim 1)(Bold added).

The reference composition is a preparation of a pigment, water-insoluble dye or brightener particle (Col. 2, lines 27-29) which is surface treated with the water-dispersible graft copolymer. The composition of the particulate solid and graft copolymer is either prepared by mixing the two components in water and separating them off or the graft copolymer is actually formed in the presence of the pigment or water insoluble dye and optionally isolated (Col 7, lines 35-41). The compositions obtained in this manner are optionally mixed with other additives and dried to form solid compositions (Col. 23, lines 3-24) notable for compatibility with hydrophobic media, especially organic hydrophobic media (Col. 24, lines 5-8).

The reference is silent relative to a particle size of the water-dispersible graft copolymer. It describes such a large range of suitable protective colloid precursors (Col. 7, lines 8-14), a virtually unlimited upper molecular weight (M_n of > 500 g/mol)(Col 7, line 34) and a broad range of per cent by weight of the protective colloid (5-300%) that a virtual unlimited range of particle size may be obtained.

Moreover, the reference describes a graft copolymer built up from 90-100% by weight of one or more ethylenically unsaturated, hydrophobic monomers including all hydrophobic ethylenically unsaturated monomers (Col. 6, lines 47-59). Nowhere does the cited reference disclose or suggest the specific composition according to the claimed invention to obtain significant improvement in paper sizing performance obtained with paper sized with the aqueous polymer dispersion according to the presently claimed invention.

In contrast, the claimed invention is directed to an **aqueous polymer dispersion** based on specific **copolymers of vinylaromatics and butadiene**, which are obtained by free radical copolymerization of (a) from 0.1 to 99.9% by weight of **styrene and/or methylstyrene**, (b) 0.1-99.9% by weight of **1,3-butadiene and/or isoprene** and (c) from 0 to 40% by weight of other ethylenically unsaturated copolymerizable monomers, the sum of the

monomers (a), (b) and (c) always being 100%, in the presence of from 10 to 40% by weight, based on the monomers used, of at least one degraded starch having a molecular weight M_n of from 500 to 40,000 and of water-soluble redox catalysts, the redox catalyst used being a combination of hydrogen peroxide and at least one heavy metal salt from the series consisting of the cerium, manganese and iron(II) salts **wherein the mean particle size of the dispersed polymer particles is from 50 to 100 nm.**

Applicants have shown significant improvement in paper sizing performance obtained according to the claimed invention in the table on page 15 of the specification. The table is reproduced below for the Examiner's convenience.

Size prepared according to	Cobb / g/m ²	Ink flotation time / min.
Example 1	27	35
Example 2	33	35
Comparative example 1	92	0
Comparative example 2	106	0
Comparative example 3	48	7
Comparative example 4	40	12
Comparative example 5	55	4

Comparative examples 1-5 represent conventional sizes for paper. Low Cobb values and high ink flotation times are favorable indication of good paper sizing performance. As shown in the table, the examples of the claimed invention show significant improvement in both Cobb values and Ink flotation time relative to conventional art.

Applicants respectfully call the Examiner's attention to the following excerpt from the Office's own discussion of "**Examination Guidelines for Determining Obviousness Under**

35 U.S.C. 103 in View of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*

“The rationale to support a conclusion that the claim would have been obvious is that **all the claimed elements were known in the prior art** and one skilled in the art could have combined the elements as claimed by known methods with **no change in their respective functions**, and the combination would have yielded **nothing more than predictable results to one of ordinary skill in the art** at the time of the invention.”⁴³ “[I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.”⁴⁴ **If any of these findings cannot be made, then this rationale cannot be used to support a conclusion that the claim would have been obvious to one of ordinary skill in the art,**” (Federal Register, Vol. 72, No. 195, page 57529) (Bold added)

Applicants respectfully submit that the cited reference neither discloses or suggests a water-dispersible graft copolymer **of vinylaromatics and butadiene** as an aqueous polymer dispersion **wherein the mean particle size of the dispersed polymer particles is from 50 to 100 nm** which provides the improved performance as a paper size as shown in the present invention.

Moreover, Giesecke neither discloses or suggests a graft copolymer that would function other than as a surface treatment for pigments, water-insoluble dyes or optical brighteners to provide compatibility with hydrophobic media. Furthermore, Applicants respectfully submit that the reference offers no motivation or suggestion that the graft copolymer would form a dispersion which would function as a size for paper.

In view of the foregoing, Applicants respectfully submit that according to the above guidelines, a conclusion of obviousness over the cited reference cannot be supported. Withdrawal of the rejection of Claims 1-4, 9 and 10 under 35 U.S.C. 103 (a) over Giesecker et al. is respectfully requested.

The rejection of Claims 1-4, 9 and 10 under 35 U.S.C. 112, second paragraph, is obviated by appropriate amendment. Claim 1 is herein amended to state “obtained” rather

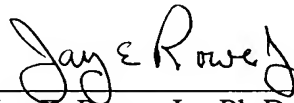
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than "obtainable." Withdrawal of the rejection of Claims 1-4, 9 and 10 under 35 U.S.C. 112, second paragraph, is respectfully requested.

Applicants submit that the above-identified application is now in condition for allowance and early notification of such action is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon



Jay E. Rowe, Jr., Ph.D.
Registration No. 58,948

Customer Number

22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 06/04)